NPIC/OS-256-63
19 August 1963

MEMORANDUM FOR: Assistant Director for Special Activities, DD/S&T

25X1A

ATTENTION: [redacted]

SUBJECT: Comparative Evaluation of Film Emulsions

REFERENCE: [redacted] 25X1A

1. Missions GT63-113, 119 and 120 were flown to provide Photography for a quality comparison evaluation between Eastman Kodak emulsion Type 8402, which is presently used in the B cameras, and Type 4400 (Formally SO-130). The B configuration camera system was used, utilizing Modes I and II at nominal altitudes. The 9L side contained emulsion type 4400 and the 9R side contained emulsion type 8402 on all missions flown for this comparison. The photography was flown over Southern California between San Diego and Bakersfield, in weather that was almost cloud free.

2. Emulsion Type 8402 is Thin Base Kodak Plus X Aerocon Film with a relative speed of 64 on an acetate support. It has an overall thickness of 2.75 mils and can resolve 95 lines per millimeter.

3. Emulsion Type 4400 is Thin Base Kodak Experimental Panatomic X Aerial Film with a relative speed of 20 on an estar support. It has an overall thickness of 2.50 mils and can resolve 160 lines per millimeter.

4. The resolving capability of either emulsion exceeds the resolving potential of the optical system employed, which is limited to 32.4-35 lines per millimeter, therefore a comparison of the two emulsions is necessarily limited by the optical system.

5. The two emulsions were exposed simultaneously on each mission. On the first mission the Lens Aperature was set to accomodate the relative speed of emulsion Type 4400, and on the second mission it was set to accomodate emulsion Type 8402. On the third mission the shutter was modified to accomodate either one of the emulsions for any seperate series of exposures. The processing was tailored to compensate for the deviations in exposures. Both emulsions were adequately exposed for comparison purposes.

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6. Camera NO. 17 was employed in Missions GT63-113 and GT63-120. There is a slight recurrent loss of resolution in portions of the photography from these missions that is attributed to either nondirectional vibration of the vehicle, partial loss of vacuum within the camera system, or insufficient camera compartment pressure. The loss of resolution is more prevelent in Mission GT63-120 when the slow shutter speed is employed but does not restrict or influence the comparison of the emulsions.

7. The comparative evaluation of the photography was subjective in that no density readings or other measurements were taken. The negatives were viewed under similar lighting conditions and negatives of equivalent densities with complimentary targets were compared. The various camera and processing data is contained in the attachment to this report.

8. CONCLUSIONS

a. Type 4400 appears to have better acquity than type 8402. The finer granular construction may influence this conclusion, but images can be studied in greater detail and the apparent ground resolution is better in type 4400.

b. A subjective analysis of the negatives indicates that emulsion 8402 appears to have greater latitude in exposure. This is especially evident when the sun angles are low. Even when emulsion 8402 is grossly overexposed, as in Mission GT63-113, manipulation in processing produced satisfactory results. If the camera system were not aperature limited to f/10, it is possible that emulsion type 4400 would exhibit the same latitude capability.

c. The thinner based emulsion type 4400 has the advantage of more film available for a mission. The additional film that can be put on the standard reel would allow approximately two hours more flying time per mission.

d. Prints from the photography obtained from these missions indicate that emulsion type 4400 will produce better enlargements because of the fin r granular construction of the negative.

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e. Unless there are other factors that must be considered, such as price differential, variance in cost of processing, abnormal keeping qualities, etc, the higher acuity of type 4400 and the advantage of more photography per mission suggests investigating the possibility of changing to this newer emulsion type 4400.

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Assistant for Operations, NPIC

Attachment: Camera and Processing Data